

# SPECTROPHOTOMETRIC ANALYSES OF PEROXIDASE ACTIVITY

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## Introduction

Peroxidases are an ever-present enzyme found in fungi, plants and vertebrates. These enzymes oxidize several substrates in the presence of hydrogen peroxide to form  $H_2O$  and  $O_2$ . Due to its physiological functions, peroxidases have many applications in a variety of fields, such as the paper industry, water purification, gene cancer therapy, and biotechnology. In the case of biotechnology, peroxidase is being used in glucose sensors to more accurately determine glucose levels [1].

## Objectives

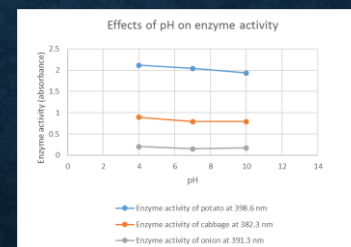
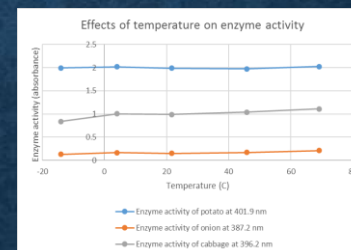
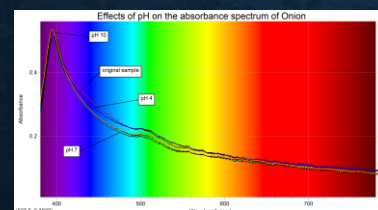
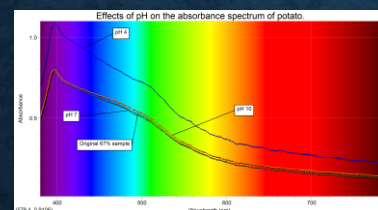
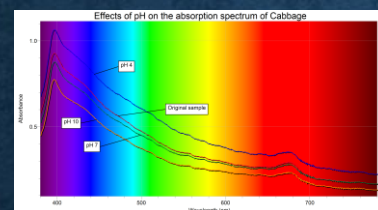
Peroxidases have a wide range of applications in biotechnology and other industries. Due to its importance, finding an optimal source of peroxidases can be beneficial to furthering these studies and our understanding of these enzymes [1]. The objective of this study is to investigate peroxidases from three common but poorly studied plant sources for their best physicochemical conditions for activity and stabilities.

## Methods

The juices of the, onion, cabbage, and potato were extracted through blending and then filtered. The concentrations of the different juices were the same and before placing them in the spectrophotometer, they were exposed to the designated temperature or pH in the presence of hydrogen peroxide.

## Results

- Cabbage: At lower temperature, enzyme activity was most affected. Optimal pH condition was around pH 4.
- Onion: showed the lower enzymatic activity, but was the least affected by condition changes
- Potato: showed the highest enzymatic activity, but was less stable than the onion pertaining to condition changes. Was not significantly affected by temperature change, but noticeably dropped as pH increased



## Discussion

Prior research has shown that the optimal pH condition for peroxidase is pH 4.5 to 5.5. This coincides with our results, which show all three sources having higher activity around pH 4 [2]. In terms of temperature, prior studies have shown that there is high thermal stability from peroxidase in plants and animals. This is shown in our results with the increase in activity of cabbage in higher temperatures [2]. According to our findings, the potato appears to have the highest enzymatic activity. The onion had the lowest enzymatic activity but it was the most stable when exposed to varying temperatures and pH.

## Conclusion

- Potato had highest enzymatic activity but it is not a reliable source for long term testing or usage.
- Onion, though lowest enzymatic activity, was the most stable under varying conditions making a more reliable source of peroxidase for future studies.
- Our methods should be updated in order to improve results and further experiments need to be done.

## References

- Ana M. Azevedo, et al (2003). Horseradish peroxidase: a valuable tool in biotechnology. *Biotechnology annual Review*, 9, 199-247.
- Mika, A., & Luthje, S. (2003). Properties of guaiacol peroxidase activities isolated from corn root plasma membranes1. *Plant Physiology*, 132(3), 1489-98.

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